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10/663,366

09/15/2003

Ronald Kuse

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EXAMINER

BUEKER, RICHARD R

ART UNIT

PAPER NUMBER

1792

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

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|------------------------------|--------------------------------------|-------------------------------------|--|
| Office Action Summary | Application No. 10/663,366 | Applicant(s) KUSE, RONALD | |
| | Examiner Richard Bueker | Art Unit 1792 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 December 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 and 23-43 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 41-43 is/are allowed.
- 6) ☒ Claim(s) 1-12, 15, 23-28 and 30-40 is/are rejected.
- 7) ☒ Claim(s) 13, 14 and 29 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-6, 23, 24 and 31-40 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Lindfors (2003/0075925) taken in view of Sandhu (2003/0072875), Tuominen (2003/0232138) and Kesala (2001/0042523). Lindfors (see Fig. 4) discloses a chemical reactant delivery system for use in semiconductor processing comprising an interior container 80 that is a boat configured to hold a liquid or solid source of gas. The boat is inside a metal chamber 30 which is heated to vaporize the source to produce the gas. Murray (5,168,543) is cited of interest for his teaching (see col. 5, lines 48-54, for example) that a metal vaporizer container changes volume by thermal expansion when it is heated. This is an inherent property of any metal chamber, including the metal chamber 30 of Lindfors. Therefore, Lindfors's chamber 30 is inherently a "variable volume chamber" as claimed by applicant. Sandhu discloses a vaporizer of the same type as that of Lindfors. Sandhu teaches that a desirably controllable vapor flow rate can be produced by providing a pressure detector 178 (see Fig. 5) and a pressure controller 146 in communication with the pressure detector and the vaporization chamber 102. The pressure controller 146 controls the heater 110 and also the optional carrier gas supply, by means of valve 158, to control the pressure inside the chamber 102. It would have been obvious to one skilled in the art to control the vaporizer apparatus of Lindfors by providing it with a pressure sensor and pressure

controller of the type taught by Sandhu, because Sandhu teaches that his control means provides a desirably controllable rate. Regarding applicant's claimed limitation of "the pressure controller to apply a force to the variable volume container based on the output of the pressure detector", it is noted that pressure is a force and Sandhu's controller increases the pressure force on the chamber whenever it increases the temperature of the chamber or increases the flow of carrier gas into the chamber. Therefore, when Sandhu's controller 146 controls the heating device 108 to increase the temperature of the chamber 102, it applies a force (i.e. pressure) by increasing the vaporization rate inside the chamber 102, and it increases the volume of the chamber 102 by thermal expansion of the chamber 102. Tuominen and Kesala disclose other examples of vaporizers of the same type as that of Lindfors. Tuominen (see paragraphs 27, 37 and 60) is cited in the rejection for his further description of the interior container. Tuominen (see paragraph 60) describes the interior container as being a source boat, and it is at least obvious that Lindfor's interior container can be a boat. Also, Kesala is cited for his teaching (see paragraph 54) that the operational temperature range of a vapor source of the type disclosed by Lindfors is 20° C to 400° C., which is a temperature range that would inherently cause a metal chamber to have a variable volume due to thermal expansion. Further regarding the claimed "variable volume chamber", it is noted that Sandhu (see paragraphs 5 and 29, for example) teaches that the volume of source material in the vaporization chamber is variable, and for this reason the vaporization chamber of Sandhu can also be described as a "variable volume chamber".

Claims 7-12 and 25-28 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Lindfors (2003/0075925) taken in view of Sandhu (2003/0072875), Tuominen (2003/0232138) and Kesala (2001/0042523) for the reasons stated above, and taken in further view of Murray (5,168,543) (see col. 5, lines 48-54, for example) who teaches that a metal vaporizer container changes volume by thermal expansion when it is heated. Murray teaches that it is desirable to provide a bellows structure for a metal vaporizer container to accommodate the thermal expansion. It would have been obvious to one skilled in the art to provide the metal container of Lindfors with a bellows structure to accommodate the expected thermal expansion due to temperature cycling as taught by Murray.

Claims 15 and 30 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Lindfors (2003/0075925) taken in view of Sandhu (2003/0072875), Tuominen (2003/0232138) and Kesala (2001/0042523) for the reasons stated above, and taken in further view of (Ohnishi (5,186,120) or Mardian (6,787,463). Ohnishi (see Fig. 1) teaches that it is desirable to use two vaporizers together in the same system, and in view of Ohnishi it would have been obvious to use two vaporizers of the type disclosed by Lindfors in a single system. Also, Mardian teaches that it is desirable to provide a further variable volume chamber in combination with a vapor source to further increase the controllability of a vapor flow to a process chamber. It would have been obvious to provide a variable volume chamber of the type taught by Mardian in combination with a vaporizer of the type disclosed by Sandhu for the desirable purpose of further increasing the controllability of the vapor flow.

Claims 13, 14 and 29 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 41-43 are considered allowable over the prior art of record.

Applicant has argued that the cited prior art does not describe or suggest the newly added claim limitation of "the pressure controller to apply a force to the variable volume chamber . . . and thereby vary the variable interior volume to regulate the pressure of the gas inside the variable volume chamber". It is noted, however, that in Sandhu's apparatus, pressure is a force and Sandhu's controller 146 increases the pressure force on the chamber 102 whenever it controls the heating device 108 to increase the temperature of the chamber or increases the flow of optional carrier gas into the chamber. Increasing the temperature also increases the volume of the chamber by thermal expansion. Therefore, when Sandhu's controller 146 controls the heating device 108 to increase the temperature of the chamber 102, it applies a force (i.e. pressure) by increasing the vaporization rate inside the chamber 102, and thereby it also varies the variable interior volume of chamber 102 by thermal expansion of the chamber 102.

Applicant has argued that one of ordinary skill in the art would not find it obvious to use the thermal expansion and contraction of Lindfors' stainless steel chamber to regulate the pressure of the gas inside the chamber. It is noted, however, that in Sandhu's vaporizer control system, the step of applying a pressure force to the chamber and the step of thermally expanding the volume of the chamber are inherent properties

of the control system. It would have been obvious to one skilled in the art to use a vaporizer control system of the type taught by Sandhu to control the vaporizer of Lindfors. In that case, the controller would inherently be a "pressure controller to apply a force to the variable volume chamber . . . and thereby vary the variable interior volume to regulate the pressure of the gas inside the variable volume chamber" of Lindfors.

Applicant has argued that changes in the volume of material held in a chamber do not inherently change the volume of the chamber. It is noted, however, that the vaporizable solid or liquid material held in a vaporization chamber does represent "a variable volume" and because it is in the interior of the chamber, it is "a variable interior volume". As it evaporates, the volume of the vaporizable material decreases, and therefore it is variable.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard Bueker whose telephone number is (571) 272-1431. The examiner can normally be reached on 9 AM - 5:30 PM, Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571) 272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Richard Bueker/
Primary Examiner
Art Unit 1763